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Educational Achievement and Ethnicity in Compulsory Schooling

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Non-Technical Abstract

This paper analyzes the evolution of the attainment gap between white British born and ethnic minority pupils throughout compulsory schooling, from the age of 5 to 16. At the start of school, pupils from most ethnic groups substantially lag behind White British pupils, but these gaps decline for all groups throughout primary and secondary school. Language is the single most important factor why most ethnic minority pupils improve relative to White British pupils. Although poverty explains part of the differences in levels, it cannot explain why ethnic minority pupils gain relative to or even overtake White British pupils. All ethnic minority groups initially attend worse performing schools than White British pupils. However, more than 20 percent of the subsequent relative improvement can be attributed to ethnic minority pupils moving up to better schools relative to White British pupils. Finally, our results suggest the possibility that the relative improvement of ethnic minority pupils may be related to teacher incentives to concentrate attention on particular pupils, caused by the publication of school league tables at the end of secondary school.

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Educational Achievement and Ethnicity in Compulsory Schooling[1]

By

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September 2008

Abstract

This paper analyzes the evolution of the attainment gap between white British born and ethnic minority pupils throughout compulsory schooling, from the age of 5 to 16. At the start of school, pupils from most ethnic groups substantially lag behind White British pupils, but these gaps decline for all groups throughout primary and secondary school. Language is the single most important factor why most ethnic minority pupils improve relative to White British pupils. Although poverty explains part of the differences in levels, it cannot explain why ethnic minority pupils gain relative to or even overtake White British pupils. All ethnic minority groups initially attend worse performing schools than White British pupils. However, more than 20 percent of the subsequent relative improvement can be attributed to ethnic minority pupils moving up to better schools relative to White British pupils. Finally, our results suggest the possibility that the relative improvement of ethnic minority pupils may be related to teacher incentives to concentrate attention on particular pupils, caused by the publication of school league tables at the end of secondary school.

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1. Introduction

Achievement gaps between groups that are ethnically and visibly different have, if persistent, the potential to create social disruption, segregation and dissonance. In the United States, the persistence of the black-white wage gap in the labor market and the black-white achievement gap in primary and secondary school is a key issue of public policy debate. Starting with the 1966 Coleman report, numerous papers have been written that illustrate the gap and that try to determine the reasons for its existence.[2] In some European countries, similar debates are ongoing. Here it is the achievement gap between ethnic minority descendents from former migration movements and native born Whites that are a reason for concern. Ethnically diverse migration that is still recognizable in the second and subsequent generations is a relatively recent phenomenon in Europe, and has been significant in numbers only since the end of the Second World War. Nevertheless, in terms of potential for social disruption, it is of similar importance to the black-white gap in the United States. This is the case in particular for those European countries that have experienced large-scale immigration of ethnic diverse populations early in the second half of the last century.[3] In this group of countries, Britain stands out, as it is perhaps the country in Europe with the longest history of ethnically diverse immigration at a larger scale (starting in the late 1940s), and with the largest and most diverse population of ethnic minority inhabitants.

In this paper, we use an extraordinarily rich data source to document and evaluate explanations of achievement gaps between ethnic minority and white British born individuals in England. The six main ethnic minority groups we consider are: Black Caribbean (the group that perhaps most closely resembles blacks in the United States), Black Non-Caribbean (of which the vast majority is of African

[2] See e.g. Donohue and Heckman (1991), Chandra (2000), Neal (2004, 2006) for evidence on racial gaps in the labor market. Recent studies that analyze black-white achievement gaps in primary and secondary school include Fryer and Levitt (2004, 2007) and Hanushek and Rivkin (2006).

[3] See for instance the latest unrest in the suburbs of French cities like Paris and Lyon, or the early 2000s riots in Northern cities of the UK, both involving disadvantaged ethnic minority groups.

descent), Indian, Pakistani, Bangladeshi, and Chinese. When comparing the educational achievement of Britain's adult ethnic minority population with that of majority white British born, the remarkably strong educational background of the ethnic minority population stands out: Ethnic minorities (British or foreign born) of any of the large minority groups out-perform white British born in terms of educational achievements (see e.g. Dustmann and Fabbri, 2005, for a detailed analysis). This seems to be in sharp contrast to what we observe very early on, just before the start of school: At the ages of 3 and 5, ethnic minority children significantly under-perform in early cognitive tests compared to the white British born pupils (see Dustmann and Trentini, 2008, who analyse the achievement gap of white and ethnic minority children at ages 3 and 5).

We focus on the period of compulsory schooling, between the ages of 5 and 16, that lays foundation for later non-compulsory education choices and economic performance in the labor market.[4] Our analysis is based on administrative data for all pupils in state schools (primary and secondary) in England. Our outcome variables are English and Mathematics test scores in nation-wide exams at age 6/7 (so-called Key-Stage 1), age 10/11 (Key Stage 2), age 13/14 (Key Stage 3), and the school leaving exams at age 15/16 (Key Stage 4). We confirm that at the beginning of primary school (Key Stage 1), ethnic minority pupils (with the exception of Chinese pupils) lag behind white British born pupils in both English and Mathematics. Remarkably, with the exception of Black Caribbean pupils, all ethnic minority pupils gain relative to white British pupils throughout primary school (i.e. from Key Stage 1 to Key Stage 2). Throughout secondary school, all ethnic minority pupils, including Black Caribbean pupils, improve relative to or even overtake White British pupils.

Our paper is not the first to address this issue for the United Kingdom. The paper closest to ours is Wilson et al. (2005) who nicely document the evolution of achievement gaps between white British born and ethnic minority pupils throughout primary and secondary school, using the same data base

[4] For instance, Neal and Johnson (1996) find that the inclusion of the AFQT score (a measure of skill that is determined prior to labor market entry) eliminates black-white wage gap for women, and explains much of the gap for men.

(though a different sample and different achievement measures) as us. Their findings are very similar to ours, and they also have been corroborated in a number of later studies and research reports (see e.g. DfES, 2005, and Cassen and Kingdon, 2007a, 2007b). We add to these papers by more extensively exploring different explanations for the divergent evolution of test scores of White British and ethnic minority pupils throughout primary and secondary school. We focus on three possible explanations: family background characteristics, school quality, and teacher incentives.

With the exception of Black Caribbean pupils, English is not a mother tongue for a remarkably high fraction of ethnic minority pupils. For instance, among Indians, the share of native English speakers is only 19.5%. We find that conditioning on English as a mother tongue substantially reduces attainment gaps in both English and Mathematics, and by slightly more in English. We also observe that the impact of language declines as children become older. Consequently, language contributes to explaining why ethnic minority pupils improve relative to white British pupils, and also helps to explain why the relative improvement is smaller for Black Caribbean pupils than other ethnic minority pupils. Moreover, with the exception of Indian and Chinese pupils, ethnic minority pupils are substantially more likely to be in poverty, which we proxy with a variable measuring eligibility for free school lunches. The inclusion of this variable likewise reduces ethnic minority attainment gaps substantially. However, poverty cannot explain why ethnic minority pupils make greater progress than white British pupils.

An issue that has received a lot of attention in the United States is school quality. We find strong evidence that ethnic minority pupils attend very different schools than white British pupils. For instance, in primary school, the average share of White British classmates for pupils who are themselves White British is 92.8%, but only 33.4% for Pakistani pupils. While much of the relative improvement of ethnic minority pupils occurs within schools, at least 20% of the progress between the beginning of primary and the end of secondary school occurs between schools.

A third explanation that we explore—teacher incentives—has received relatively little attention. The idea here is as follows. At the end of Key Stage 4, the Department for Education and Skills publishes so-called school league tables, which report the share of pupils who passed at least 5 GCSEs, including Mathematics and English, with a grade of C or better. These reports are extensively discussed in the media, such as the Times or BBC news. This provides incentives for teachers to focus their attention on pupils who are most likely to just pass or just fail the target (i.e. teaching to the test – see Lazear, 2006, and Neal and Whitmore Schanzenbach, 2007). If ethnic minority pupils are more likely to fall in this attention interval, then incentives induced by the publication of school league tables could contribute to why ethnic minority pupils make greater progress than White British pupils, in particular between Key Stage 3 and 4. By and large, we find evidence that is consistent with this idea. In particular, such teacher incentives may contribute to why test score gains of ethnic minority pupils relative to White British pupils are higher among poor pupils and in poor schools. Teacher incentives are similar at the end of primary school at Key Stage 2, but here the evidence is weaker.

The structure of the paper is as follows. The next section provides some background information on ethnic minority groups in Britain and on the English school system. In Section 3, we describe the data and the samples we use for our analysis. Section 4 documents the basic facts about achievement gaps between British born white and ethnic minority pupils through primary and secondary school, and briefly compares our findings to those of earlier UK studies. In section 5, we investigate three explanations for our findings: different family background characteristics, different school quality, and teacher incentives. Section 6 concludes.

2. Background

This section first provides an overview of how ethnic minorities in the UK fare in the labor market. We focus on England, since our school data only covers pupils in England, but not in Wales, Northern-Ireland, and Scotland. We then briefly describe the English education system.

2.1 Ethnic Minorities in the Labor Market

According to the 2001 Census ethnic minority groups account for 9.1% of the total English population, up from 6.2% in 1991. The six main ethnic minority groups are: Black Caribbean, Black African, Indian, Pakistani, Bangladeshi, and Chinese. These are also the six groups that we will distinguish in our analysis of school achievement below. Individuals who belong to these groups arrived nearly exclusively in the period after the Second World War, but their arrivals have been at different stages, and triggered by different events. While the majority of immigrants from the Caribbean arrived in the period between 1955 and 1964, the main time of arrival of Black African, Indian and Pakistani first generation groups was between 1965 and 1974 (Peach, 1968, 1996). Bangladeshi arrivals peaked in the period 1980-1984. The smallest, and fastest growing, group is the Chinese who started to arrive in the UK in the 1980s, after mainland China was opened to the western world.

Table 1 gives an overview of the main ethnic minority groups based on the Labor Force Survey, pooled for the years 2003 and 2004, separately for men and women. Results refer to ethnic minorities in England. Here, we summarize Black Africans and Blacks with a background other than Caribbean or African into one category.[5] The first column reports the population share of each ethnic minority group. The biggest groups are Indians and Pakistani, followed by Blacks of Caribbean or other heritage. The next column shows the share born in the UK. This share is highest for Black Caribbeans,

[5] In this category, about 84% are Black African.

the group that arrived first in the UK, and lowest for the Bangladeshi and Chinese, the two groups that arrived latest. The table also shows that with the exception of Black Caribbean men and Bangladeshi women, the average years of education among ethnic minorities exceeds that of the White British working-age population (Column 3). The difference is particularly striking for Indian and Chinese men and women, as well as men and women from any other background. In contrast, employment rates are substantially higher among White British men and women than among ethnic minorities (Column 4). Despite the (slightly) higher levels of education, Black, Bangladeshi and Pakistani men as well as men from other ethnic backgrounds earn considerably lower wages than White British men; for Bangladeshi men the difference is as large as 40%. Chinese and Indian men earn slightly higher wages than White British men (Column 5). A more detailed description of the labor market experiences of ethnic minority groups throughout the 80s and 90s can be found in Dustmann and Theoropoulos (2006).

2.2 The Education System in England

We now turn to explaining the key features of the education system in England, which in many aspects is different from education systems in the United States or Continental Europe and indeed to the education systems of the other countries in the United Kingdom (it is much more regulated than in Wales, Scotland and Northern Ireland). One very important feature of the system is the centralized assessment of pupils' understanding of the curriculum (see Machin and Vignoles, 2005, for more details). Testing takes place in 4 key stages, Key Stage 1 from grade 1 to 2 (age 5 to 7), Key Stage 2 from grade 3 to 6 (age 8 to 11), Key Stage 3 from grade 7 to 9 (age 12 to 14), and Key Stage 4 from grade 10 to 11 (age 15 to 16). Primary schools cover Key Stage 1 and Key Stage 2, while secondary schools comprise Key Stage 3 and Key Stage 4. The end of Key Stage 4 marks the end of compulsory schooling. At the end of each key stage, pupils take nation-wide exams that are anonymously marked by external graders. Throughout Key Stage 1 to Key Stage 3, pupils are assessed in the core disciplines English, Mathematics, and Science (not in Key Stage 1). Key Stage 4 exams are the school leaving age

exams also known as GCSE exams (General Certificate of Secondary Education). Here, pupils can take a variety of subjects, ranging from foreign languages to arts and design to information technology. However, the core subjects English and Mathematics are mandatory for all pupils. In this paper, we focus on English and Mathematics scores that are tested in each Key Stage.

Most pupils switch schools, making the transition to secondary school, at the end of primary school.[6] About 45% of pupils move schools at the end of Key Stage 1; of those, about three quarters leave because their school does not offer grades 3 to 6. Less than 5% of pupils attend a different school in Key Stage 4 than at Key Stage 3 (see Machin, Telhaj and Wilson, 2006, for a detailed descriptive analysis of school switching in English schools). There is little to no grade repetition in England. This means that pupils who entered school in the same year take their key stage exams in the same year. Hence, our estimates for the evolution of achievement gaps between White British pupils and ethnic minorities will not be affected by selection caused by different grade retention rates across ethnic groups. This may be a problem in commonly used US data sets, such as the Early Childhood Longitudinal Study (e.g. Hanushek and Rivkin, 2006).

At each key stage, the Department for Education and Skills sets specific achievement targets that pupils are supposed to meet. For instance, the target at Key Stage 2 is Level 4 in English, Mathematics, and Science, which in 2003 was met by about 80% of pupils. The target at Key Stage 4 is passing at least 5 GCSEs with C or better, including English and Mathematics, which in 2003 was met by 55% of pupils. Each year, the Department of Education and Skills publishes school league tables that report the share of pupils above the target in each school in Key Stage 2 (primary schools) and Key Stage 4 (secondary schools). These reports are extensively discussed in the media, such as the Times or BBC news.

[6] The majority of English local education authorities (LEAs) have only primary and secondary schools, but a small minority also have middle schools that pupils attend between primary and secondary school. In the former group pupils make the transition from primary to secondary schools between grades 6 and 7; in the latter the transitions vary across LEAs, with pupils moving from primary to middle school during the later primary grades in the two tier system and from middle to secondary during the early secondary grades.

A small, but growing literature demonstrates that parents significantly value these dimensions of school quality. Hedonic house price equations research uncovers a significant link between house prices and primary school performance (see Black, 1999 for US evidence, Gibbons and Machin, 2003, 2006 for evidence from England and the literature review of Gibbons and Machin, 2008). It is evident that the league tables convey important information to parents which can influence the demand for particular schools. In the English education system head teachers (school principals) also have incentives to maximize student numbers since money follows pupils. We return to this below since it does mean that schools that want to attract more pupils have incentives to improve their league tables performance. We investigate whether this induces aspects of 'teaching to the test' for pupils close to government Key Stage 2 and Key Stage 4 performance targets and whether these differ across ethnic groups.

3. Data Description

Our empirical analysis is primarily based on the National Pupil Data Base (NPD). We also report some findings based on the Millennium Cohort Survey (MCS). We describe each data set in turn.

3.1 The National Pupil Data Base (NPD)

The National Pupil Data Base (NPD) covers all pupils in all state primary and secondary schools in England, and is available from 1996 to 2007. The data are collected by the Department for Education and Skills, which uses the data to construct the annual school league tables. It is mandatory for schools to provide accurate data on pupils. Pupils can be followed from year to year and across schools through a pupil identifier. For each key stage, the NPD contains, among other achievement outcomes, English and mathematics test scores. To make test scores comparable across years, we standardize them to have a mean of 50 and a standard deviation of 10. Precise variable definitions can be found in Appendix A.

This data base can be merged with information from the Pupil Level Annual Schools Census (PLASC), which is available on an annual basis beginning in 2002. This data base includes a number of pupil-level background characteristics (not in the NPD data); most importantly, ethnicity, whether or not English is the mother tongue, as well as an indicator for family poverty. The ethnicity variable distinguishes the main ethnic minorities in England: Black, Caribbean; Black, other background (of which 84% are Black African); Bangladeshi; Pakistani; Indian; Chinese; and Other (see also Section 2.1 and Table 1). The latter group is particularly heterogeneous, ranging from West and East Europe, to the Middle East, to the Far East (other than the ethnic minorities listed above). This group also includes pupils with mixed background.

The indicator variable for English as a mother tongue measures whether the first language to which the child was exposed was English. If the child was exposed to more than one language and these include English, English is taken as the mother tongue. In contrast, if a child acquires English subsequent to early development, then English is not their mother tongue no matter how proficient the pupil becomes. Our proxy indicator for family poverty is eligibility for free school meals. Pupils who receive free meals are the 15 to 20% poorest pupils.

From this data base, we select all pupils who took Key Stage 1 exams in 1998 and can be followed throughout the end of compulsory schooling, i.e. Key Stage 4 exams in 2007. We restrict the sample to pupils who have valid test scores in Mathematics and English in each key stage, and pupils with non-missing information on ethnicity, free meal eligibility, and English as a mother tongue. The final sample accounts for about 75% of all pupils who sat Key Stage 1 exams in 1998.

One may worry that, due to the fairly large reduction in sample size, our findings may not be representative for the cohorts as a whole. However, several robustness checks indicate that test score gaps between the White British and ethnic minorities evolve similarly throughout primary and secondary school no matter which sample restrictions are used. For instance, attainment gaps are similar if the sample includes all pupils who take key stage exams in the relevant years.

Table 2 provides an overview of the estimation sample. Notice that due to the administrative nature of our data, the sample size is substantially larger than comparable studies for the US, such as Fryer and Levitt (2004). The share of White British pupils in the two samples is about 85%, and thus about 5% lower than in England as a whole (see Table 1). This probably reflects the higher fertility rate of ethnic minority groups. As for the whole English population, the two largest minorities are the Indians and Pakistani, followed by Blacks with Caribbean or other heritage.

With the exception of Indians and Chinese, the share of pupils who are eligible for free school meals is substantially higher among ethnic minorities than among White British pupils. In the case of the Bangladeshi, the difference is as large as (about) 40 percentage points. From Table 1, this is also the group with the lowest employment rate and the lowest wage, while wages of Indian and Chinese men are similar to those of White British men. For the vast majority of pupils with Bangladeshi, Pakistani, Indian or Chinese background, English is not their mother tongue. In contrast, only 5% of Black Caribbean pupils were not exposed to English in early childhood. As expected, since there is virtually no grade repetition, the average age at Key Stage 1 and 4 is virtually identical across ethnic groups.

3.2 The Millennium Cohort Study (MCS)

The Millennium Cohort Study (MCS) is a longitudinal survey that follows a random sample of about 20,000 children who were born in the United Kingdom between September 2000 and August 2001.[7] Blacks and Asians are over-sampled. Since the start of the survey, children have been followed twice, once at age 3 and again at age 5, just before the start of school. We use this data base to compute achievement gaps between White British pupils and ethnic minorities at the start of school, at age 5 (see Dustmann and Trentini, 2008, for an extensive analysis of the evolution of achievement gaps and the effects of pre-school attainment from age 3 to 5). At age 5, the MCS includes three achievement outcomes, the Picture Similarity Assessment, the Naming Vocabulary Assessment, and the Pattern

[7] In Scotland and Northern Ireland, children born between December 2000 and October 2001 form the base population.

Construction Assessment. We describe each test in more detail in Appendix B. Test scores are standardized to mean 50 and standard deviation 10. Ethnic groups are defined in the same way as in the NPD. We restrict the sample to children in England. Our final sample consists of 9,012 to 9,039 pupils, depending on which achievement outcome is used. We use sampling weights to make our results representative for the child population as a whole.

4. Achievement of Ethnic Minorities throughout Primary and Secondary School – The Basic Facts

This section documents how test score gaps in English and Mathematics between White British pupils and pupils from ethnic minorities evolve throughout primary and secondary school. We then compare our findings with those of earlier studies for the UK.

4.1 The Basic Facts

The figures in Table 1 indicate that, with the exception of Black Caribbean men and Bangladeshi women, average years of education among ethnic minorities in Britain exceeds that of the White British working-age population. This advantage is particularly large for Indian and Chinese men and women, as well as men and women from any other background.

Entry Gaps

How does the achievement of White British children differ from that of children from ethnic minorities just before the start of school, at the age of 5? Table 3 reports achievement gaps based on a Vocabulary Naming Assessment, a Picture Similarity Assessment, and a Pattern Construction Assessment, from the MCS. According to all tests, white British pupils outperform ethnic minority pupils, which is in contrast with the overall educational advantage of ethnic minorities at working age. According to the Vocabulary Naming Assessment, scores of all ethnic minority children are at least 42% of a standard deviation lower than those of White British children; for non-Caribbean blacks,

Bangladeshi, and Pakistani children, the gap is larger than 1 standard deviation. Achievement gaps are substantially smaller for the Picture Similarity and Pattern Construction Assessment. There is again substantial heterogeneity across ethnic groups: While the achievement gap is at least 30% of a standard deviation for Black Caribbean, other black (Pattern Construction Assessment), Pakistani and Bangladeshi children (Pattern Construction and Picture Similarity Assessment), it is insignificant or even positive for Indians, Chinese and other ethnic minority children—although these groups considerably lack behind in the Vocabulary Naming Assessment.

These findings provide a first indication that achievement gaps between White British and ethnic minority children may be partly due to English language ability, as one would expect it to matter more in the Vocabulary Naming Assessment than in the other two Assessments. Moreover, the two ethnic groups with the lowest share of children for whom English is the mother tongue, Bangladeshi and Pakistani, experience the lowest scores.

The Achievement Gap through Primary and Secondary School

How do achievement gaps evolve through primary and secondary school? Figure 1 plots the English (Panel A) and Mathematics (Panel B) test score gaps at the end of 2nd grade at the age of 6/7 (Key Stage 1), at the end of 6th grade at the age of 10/11 (Key Stage 2), at the end of 9th grade at the age of 13/14 (Key Stage 3) and at the end of compulsory schooling at the age of 15/16 (Key Stage 4). Unfortunately, it is difficult to compare these gaps with the entry gaps at age 5, for two reasons. First, they refer to a different cohort of children, born about 10 years earlier than the children in the MCS. Second, the achievement outcomes are not directly comparable. However, a certain pattern is visible (see also Tables 4a and 4b). Ethnic groups that performed poorly in the Pattern Construction Test at age 5 (i.e. Black Caribbean, Black other, Bangladeshi, and Pakistani) tend to perform poorly, while groups that performed well at age 5 (i.e. Indian, Chinese and other background) tend to perform somewhat better, in the Key Stage 1 English and mathematics exams.

Do achievement gaps between White British and ethnic minority pupils widen or narrow throughout primary and secondary school? Figure 1 shows that through primary school, from Key Stage 1 to Key Stage 2, most ethnic minority groups catch up, or in the case of Chinese and Indian pupils, even overtake White British pupils, in both English and mathematics. The catch-up (or over-taking) is most striking for Bangladeshi and Chinese pupils, for whom the gain exceeds 20% of a standard deviation. The only group for which we do not observe a narrowing of the achievement gap in primary school is Black Caribbean pupils. For this group, both the English and mathematics test score gap widened by about 6% of a standard deviation over a 4 year period.

Does the catch-up (or, in the case of Black Caribbean pupils, the fall back) of the achievement gap continue through secondary school? The widening of the achievement gap between White British and Black Caribbean pupils appears to have stopped, as the English and mathematics gap at the end of primary school at Key Stage 2 and at the beginning of secondary school at Key Stage 3 is roughly the same. All other groups continue to catch up or, in the case of Chinese pupils, pull away from White British pupils throughout compulsory schooling. All groups, including Black Caribbean pupils, experience particularly large gains between Key Stage 3 and Key Stage 4.[8] At the end of compulsory schooling, Indian and Chinese pupils outperform White British pupils by more than 30% of a standard deviation in both English and mathematics. Recall from Table 1 these are also the two ethnic groups with the highest educational attainment. All other ethnic minorities perform worse on average than White British pupils, where Black Caribbean pupils lack behind most.

4.2 Comparison with UK Studies

How do these findings compare with existing findings for the UK? The most comprehensive study is by Wilson et al. (2005) who use the same data source, but somewhat different samples and achievement outcomes, as us to document ethnic achievement gaps through primary and secondary

[8] This is particularly striking in mathematics. This could be due to the fact that pupils can choose between 5 tiers (A-E) at the Key Stage 3 mathematics exams, where the maximum number of achievable points is higher at the higher tiers. All ethnic minority groups are less likely to sit higher-tier exams, even conditional on their performance at Key Stage 2.

school. Not unsurprisingly, their findings are similar to ours; in particular, they stress that much of the improvement of ethnic minorities relative to White British pupils in secondary school happens from Key Stage 3 to Key Stage 4. Our results also confirm earlier findings by the Department of Education and Skills (e.g. DfES, 2005). For instance, this report emphasizes that, with the exception of Black Caribbean pupils, ethnic minority pupils improve relative to White British pupils, especially between Key Stage 1 and 2 and Key Stage 3 and 4. However, this report only looks at measures of value added between to successive key stages, and does not analyze the dynamics of the achievement gap through primary and secondary school. Similarly, recent research by Cassen and Kingdon (2007a, 2007b) notes that the Chinese and Indians are the most successful ethnic groups, while Black Caribbean pupils are the least successful.

5. The Evolution of Achievement Gaps through Primary and Secondary School – Explanations

We now push forward and explore three possible explanations for the divergent evolution of test scores of White British and ethnic minority pupils throughout primary and secondary school: different family background characteristics, different school quality, and teacher incentives.

Before we discuss each explanation, we would like to rule out a fourth explanation: teacher bias. Since all key stage exams are centralized and anonymously marked by external graders, it is unlikely that achievement gaps as well as the progress of ethnic minority pupils relative to White British pupils is due to teachers being biased against ethnic minorities.

5.1 The Role of Family Characteristics

We first analyze how ethnic attainment gaps are affected by family characteristics. Notice that if the influence of these characteristics changes through the course of primary and secondary school, they do not only help explaining differences in the level of attainment, but also why some ethnic groups (e.g. Indian pupils) improve more relative to White British pupils than others (e.g. Black Caribbean

pupils). We focus on two characteristics, poverty, measured by the proxy variable measuring whether the child is eligible for free meals[9], and English language ability, measured as whether English is the mother tongue. We acknowledge that both variables may be correlated with other (to us) unobserved family characteristics, such as parental education or parental aspiration that may affect pupil achievement. We are not able to isolate these factors from poverty and language. It is also important to stress that the impact of poverty and language ability on test scores should be interpreted as an association only, and not as a causal relationship.

Language

Our findings based on the Millennium Cohort Study in Section 4.1, in particular the finding that ethnic achievement gaps based on the Naming Vocabulary Assessment are substantially larger than those for the Picture Similarity and Pattern Construction Assessment, provided a first indication that English language ability may play an important role in explaining ethnic achievement gaps. We explore this further in Table 4a (English) and 4b (Mathematics), where we report in the second set of columns ("*language*") achievement gaps conditional on an indicator whether English is the child's mother tongue. For comparison, the tables also show the raw attainment gaps (Figure 1). The second last row in each panel ("**language**") shows the coefficient on English as a mother tongue at each key stage.

There are several noteworthy patterns. First, at each key stage, and for both English and Mathematics, conditional attainment gaps are considerably smaller than raw attainment gaps, in particular for ethnic groups with a large share of non-native speakers, such as the Bangladeshi and Pakistani (Table 2). Second, at each key stage, English as a mother tongue tends to have a stronger impact on English than on Mathematics test scores. Most importantly, the importance of English language ability declines as children become older; at Key Stage 4, the coefficient on English as a

[9] Hobbs and Vignoles (2007) provide an extensive discussion whether free meal status provides a valid proxy for socio-economic status.

mother tongue is only 0.556 for English, and even negative for Mathematics. Consequently, language contributes to why, with the exception of Black Caribbean pupils, ethnic minority pupils improve relative to White British pupils.

We analyze this in Panel C where we report the share of the change in test score gaps between Key Stage 1 and 2, Key Stage 2 and 3, Key Stage 3 and 4, and between Key Stage 1 and 4 that can be attributed to language.[10] Between Key Stage 1 and 2, language alone is fully able to explain the greater progress of Pakistani and Indian pupils relative to White British pupils in English, and accounts for 25 to 32% of the catch-up of the Bangladeshi, Chinese, and ethnic minorities from other backgrounds. English as a mother tongue remains powerful at predicting the greater progress of ethnic minorities through secondary school, between Key Stage 2, 3 and 4, in both English and Mathematics. Finally, language helps to explain why Black Caribbean pupils, for most of whom English is the mother tongue, improve less than any other ethnic group. For instance, the numbers in Table 4a imply that about 50% of the greater progress of Indian relative to Black Caribbean pupils in English between Key Stage 1 and 4 is due to language.[11]

Poverty

Next, we explore how poverty status, measured as free school meal eligibility, affects attainment gaps between White British pupils and ethnic minority groups. Results can be found in the third sets of columns ("*poverty*") in Table 4a (English) and Table 4b (Mathematics). The last row of each panel reports the coefficient of free meal eligibility on test scores at each key stage ("**poverty**"). The inclusion of free meal eligibility substantially reduces the attainment gaps for the four poorest groups,

[10] The shares are computed as $(1-(gap_x^{con} - gap_y^{con})/(gap_x^{raw} - gap_y^{raw})) \cdot 100$, where gap_x^{con}, gap_x^{raw}, gap_y^{con}, and gap_y^{raw} are the conditional and raw achievement gaps at Key Stage x and y, respectively. For instance, (1-(-2.385+2.254)/(-4.583+5.434))*100 (=115.45%) of the improvement of Pakistani relative to White British pupils in English between Key Stage 1 and Key Stage 2 can be attributed to English. Note that if the ethnic achievement gap hardly changes between two Key Stages, the numbers in Panel C are not very meaningful.

[11] This share is computed as follows. The raw relative achievement gaps in English between Indian and Black Caribbean pupils are -0.028 at Key Stage 1 and 4.680 at Key Stage 4. The respective gaps conditional on English as a mother tongue are 2.748 and 5.1. Hence, (1-2.352/4.708)*100, i.e. around 50%, of the greater progress of Indian relative to Black Caribbean pupils between Key Stage 1 and 4 is due to language.

Black Caribbean and Other, Pakistani, and Bangladeshi, at all key stages and in both Mathematics and English. For instance, at Key Stage 1 the raw gap in English between Bangladeshi (Black Caribbean) and White British pupils is -6.513 (-1.377), compared to -4.435 (-0.410) conditional on free meal eligibility. By the end of compulsory schooling at Key Stage 4, Non-Caribbean Blacks, Pakistani, and Bangladeshi pupils have completely caught up or even overtaken White British pupils, conditional on free meal eligibility. Black Caribbean pupils, in contrast, continue to perform worse than White British pupils at Key Stage 4 even conditional on poverty status.

Also notice that the negative impact of free meal eligibility increases somewhat in absolute magnitude as children become older. For instance, at Key Stage 2, free meal eligibility reduces English test scores by about 55% of a standard deviation, compared to 65% of a standard deviation at Key Stage 4. Consequently, being poor cannot explain why most ethnic minority children catch up with or even overtake White British pupils throughout primary and secondary school (see also Panel C in Tables 4a and 4b). This makes the progress of poor ethnic minority groups, such as Bangladeshi and Pakistani, relative to White British pupils all the more remarkable.

For completeness, Table 4a and 4b also report findings that condition on both English as a mother tongue and poverty status, and the results mirror the previous ones. Also notice that both background characteristics reduce the heterogeneity across ethnic groups, in particular at Key Stage 1. Here, the difference in the raw achievement gap between the lowest (Bangladeshi) and best (Chinese) performing English minority group in English is 5.757, compared to 3.764 for the conditional attainment gaps.

The analysis so far assumed that the impact of free meal status is the same across all ethnic groups. However, it turns out that the association between free meal status and achievement is stronger for White British pupils than for ethnic minority groups (see also Kingdon and Cassen 2007). The association is smallest for Bangladeshi pupils who have the highest poverty rates (see Table 2). When we evaluate the importance of poverty on ethnic achievement gaps using the coefficient for ethnic

minorities as opposed to the (in absolute terms larger) average coefficient, poverty contributes less to explaining ethnic achievement gaps, but our overall conclusions are unchanged.

5.2 The Role of Schools

How does school quality affect the progress of ethnic minorities relative to White British pupils? Next, we shed new light on these questions by analyzing whether the worsening of Black Caribbean pupils during primary school and the progress of all other minority groups through primary and secondary school predominantly occurs within or between schools.

Before we present results, we would like to point out that ethnic minority pupils attend very different schools than White British pupils (results are not reported). First, in our sample, segregation is considerable: Whereas at Key Stage 1 91% of the school mates of White British pupils are themselves White British, the corresponding share is less than 45% for Black, Bangladeshi, Indian, and Pakistani pupils. Segregation is considerably lower at the neighborhood (local education authority) level, indicating that school level segregation is not adequately explained by residential segregation. Moreover, all ethnic minority groups have schoolmates that are substantially poorer than those of White British pupils, and perform worse in English and Mathematics key stage exams. Overall, all ethnic minority groups tend to attend worse schools than White British pupils, which makes their relative improvement all the more remarkable.

Table 5a (English) and 5b (Mathematics) examine the role of schools more closely. In Panel A, we compare raw attainment gaps with those that condition on school fixed effects and are thus exploit variation within schools only. To keep the tables as simple as clear as possible, we chose not to report standard errors for the school fixed effect estimates. Instead, a star (*) denotes that the coefficient is not significant at a 5% level.

For al ethnic groups, the test score disadvantage (i.e. Black Caribbean and Non-Caribbean, Pakistani, and Bangladeshi pupils), or their test score advantage (Chinese and Indian pupils in secondary school) decrease substantially when school fixed effects are included, through all key stages

and in both English and Mathematics. This demonstrates the importance of schools in explaining ethnic achievement gaps.

However, as Hanushek and Rivkin (2006) point out, this exercise may be misleading if there is substantial ethnic segregation at schools, as the following extreme example illustrates. Suppose that only 5% of black pupils attend schools where White British pupils are present. When school fixed effects are included in the regression, it is these 5% that identify the relative achievement gap. If these pupils perform much worse than their White British classmates, then the fixed effect estimator attributes most of the achievement gap to within-school factors, although it is predominantly due to between-school factors. In order to circumvent this problem, Hanushek and Rivkin (2006) suggest decomposing the achievement gap between White British pupils and pupils from ethnic minority group E, $\overline{A}_W - \overline{A}_E$, as follows:

$$\overline{A}_W - \overline{A}_E = \{\sum_s \frac{n_{WS}}{n_W}\overline{A}_s - \sum_s \frac{n_{ES}}{n_E}\overline{A}_s\} + [(\frac{1}{n_W} - \frac{1}{n_E})\sum_s (\overline{A}_{Ws} - \overline{A}_{Es})\alpha_s(1-\alpha_s)n_s].$$

The term in curly {} brackets represents the between-school component that explicitly takes into account the different distribution of White British and ethnic minority pupils across schools with different levels of achievement. The terms $\frac{n_{WS}}{n_W}$ and $\frac{n_{ES}}{n_E}$ denote the share of White British pupils and pupils of ethnic minority group E in school s. The term in square [] brackets represents the within-school component, and is a weighted average of ethnic attainment gaps in each school. Further, α_s denotes the share of pupils who belong to ethnic group E among White British and ethnic group E pupils in school s.

Panel B in Table 5a and 5b report results from this decomposition. Consider first the four ethnic minority groups that perform most poorly, e.g. Black Caribbean and Black Other, Bangladeshi, and Pakistani. Here, more than half of the raw gap is due to the between-school component at each key stage, for both Mathematics and English. For instance, the achievement gap in English of Black

Caribbean pupils relative to White British pupils is -1.377, of which -0.209 is due to the within-school, and -1.168 is due to the between-school component. Interestingly, at Key Stage 4, the within- and between-school components have opposite signs for black Non-Caribbean, Pakistani, and Bangladeshi pupils, indicating that they attend worse schools on average than White British pupils, but do better than their White British peers in these schools. Turning to Indian and Chinese pupils, they attend worse schools than their White British counterparts in Key Stage 1, but outperform them in these schools. By Key Stage 3, after the transition from primary to secondary school, both Indian and Chinese pupils go to better schools than White British pupils, although more than half of the attainment gap is within schools.

Does the worsening of Black Caribbean pupils relative to White British pupils in primary school and the relative improvement of all other ethnic groups throughout primary and secondary school predominantly occur within or between schools? In Panel C in Table 5a and 5b, we report the share of the change in the relative attainment gaps between two key stages that happens within schools. The results show that a substantial part, typically more than 50%, of the catch-up of ethnic minority groups (or the worsening of Black Caribbean pupils in primary school) happens within schools, in particular between Key Stage 3 and 4 when few pupils switch schools. Yet, for most ethnic groups at least 25% of the relative improvement can be attributed to between-school factors. This means that ethnic minority pupils move up to better schools relative to White British pupils or, in the absence of pupil mobility through school switching, schools with a higher share of ethnic minority pupils make more progress than schools with predominantly White-British pupils.

We have repeated the analysis conditional on indicator variables for English as a mother tongue and poverty that we found to be important in explaining relative attainment gaps in the previous section. Our overall conclusions are similar. The main difference is that the between-school component becomes smaller for most ethnic groups, suggesting that pupils sort into schools based on poverty and language.

5.3 Teacher Incentives: Teaching to the Test

This section focuses on the larger than average gains of ethnic minority pupils relative to White British pupils from Key Stage 3 to Key Stage 4. We explore an explanation that has received relatively little attention in education research in England: teacher incentives. The idea is as follows. Each year, the Department for Education and Skills (now the Department for Children, Families and Schools) publishes school league tables, which report the share of pupils who passed at least 5 GCSEs, including Mathematics and English, with a grade of C or better. These reports are extensively discussed in the media, such as the Times or BBC news. On average, about 58% of pupils meet the target. There is considerable variation across schools: Whereas in the top schools, almost every pupil meets the target, there are also low-performing schools in which hardly any pupil achieves the target.[12]

School league tables may provide (probably implicit) incentives for teachers to focus their attention on pupils who are most likely to end up close to the target. Pupils who are likely to fail anyway may receive less attention, and the same may be true for pupils who are likely to pass anyway. Figure 2 shows that teachers should concentrate on pupils in the middle range of the test score distribution. In the figure, we group pupils into 10 equally sized groups based on their Key Stage 3 English test score. The figure plots the probability that pupils in each group end up just failing or just passing the Key Stage 4 target, which we define as passing 4, 5, or 6 GCSEs with a grade of C or better. The probability of ending up close to the target about 30% for pupils in the middle of the English test score distribution, but only about 5% for the 10% best and worst pupils. If ethnic minority pupils are more likely to be in danger of just failing the target, or show more promise at just passing the target, than White British pupils, then ethnic minority pupils may receive more attention from teachers on average than White British pupils—which may contribute to why ethnic minority pupils experience the large relative gains from Key Stage 3 to 4. Neal and Whitmore-Schanzenbach (2007) analyze similar teacher incentives within the US context of the No Child Left Behind Act and, based

[12] See e.g. http://www.timesonline.co.uk/tol/life_and_style/education/a_level_gcse_results for the years 2006 and 2007.

on Chicago Public School data, find strong empirical support.[13] Next, we provide some evidence that is generally consistent with this idea.

If ethnic minority pupils gain more relative to White British pupils from Key Stage 3 to Key Stage 4 because they receive more attention from their teachers, we would expect to see more ethnic minority pupils close to the target. We find some mild support for this (not reported). The probability that a White British pupil just met or just failed the target, which we again define as passing 4, 5, or 6 GCSEs with grade C or better, is 20.7%. Black (Caribbean and Non-Caribbean), Pakistani and Bangladeshi pupils are up to 3 percentage points more likely to end up close to the target. However, Chinese pupils also experience stronger gains from Key Stage 3 to Key Stage 4 than White British pupils, but they are 6% less likely to end up close to the target.

If teachers pay more attention to pupils who may just fail or just meet the target, we would also expect test score gains between Key Stage 3 and Key Stage 4 to be higher for groups of pupils teachers focus on. We explore this in Table 6.[14] Panel A first shows that ethnic minority pupils who are eligible for free school meals tend to experience greater gains in English than ethnic minority pupils who are not, whereas the opposite is true for White British pupils. Panel A also shows the probability that eligible and non-eligible ethnic minority and White British pupils barely miss or barely hit the Key Stage 4 target. By and large, groups that experience larger gains are also somewhat more likely to end up close to the target. The correlation between the two is 0.46 and the hypothesis that it is 0 can be ruled out at a 8% level.

In Panel B, we repeat the exercise for rich and poor schools, defined as the schools with the 20% lowest and highest share of pupils eligible for free meals. Clearly, test score gains of ethnic minority pupils are concentrated in poor schools (for which school league tables may matter more), whereas

[13] See also Lazear (2006) for a theoretical analysis.

[14] In the table, we pool 5 cohorts who sat Key Stage 3 exams between 2001 and 2005, and Key Stage 4 exams between 2003 and 2007. We do this in order to gain precision. If we restrict the analysis to the cohort that sat Key Stage 3 and 4 exams in 2005 and 2007, the patterns are similar, but standard errors are larger.

White British pupils experience larger gains in rich schools. Again, groups that see greater gains tend to be more likely to end up close to the target; the correlation between the two is 0.324 and the hypothesis that it is 0 can again be rejected at a 2% level. We also observe a positive correlation between gains in English test scores between Key Stage 3 and 4 and the probability of ending up close to the target if we break down the analysis by English language ability.

A potential concern with this approach of looking at the actual probability of getting Key Stage 4 grades close to the target is that pupils are getting these grades *after* 'teaching to the test' has occurred. Ideally, one would like to identify those pupils who receive more attention from teachers before they take Key Stage 4 exams. To this end, we predict for each pupil the probability that she barely misses or hits the target based on her Key Stage 3 English test score, which is taken before teaching to the test occurs. We do this in the same way as in Figure 1. The idea here is that this is how teachers may decide which pupils to focus on. The last rows of Panels A and B in Table 6 report the correlation between the gains in English test scores between Key Stage 3 and 4 and the predicted (as opposed to actual) probabilities of being around the target. Correlations are very similar to those based on the actual probabilities.

These findings are consistent with the idea that teacher incentives caused by the annual publication of school league tables contribute to explaining why test score gains of ethnic minority pupils relative to White British pupils are higher among poor pupils and in poor schools.

Incentives may also exist for teachers at the end of primary school, with the Key Stage 2 exams. Here, the school league tables mostly report the share of pupils who reach level 4, separately for English, Mathematics, and Science. We again find that ethnic minority pupils are somewhat more likely to just fail or just pass the target than White British pupils. However, the correlation between test score gains and the probability of ending up around the target by ethnicity and free meal status, or ethnicity and school types, is weaker and not statistically significant from zero. There are a few possible explanations as to why teacher incentives matter more at Key Stage 4 than at Key Stage 2.

First, while about 58% of pupils meet the Key Stage 4 target, the number is substantially higher for the Key Stage 2 target, about 82%. Second, teachers in primary schools often teach several subjects, while teachers in secondary schools typically teach only one subject. This makes it easier for teachers in secondary schools to focus on pupils who are most in danger of failing the target. Third, and perhaps most important, the Key Stage 4 figures are more high profile than the Key Stage 2 results.

6. Conclusion

This paper documents the evolution of the achievement gap in Mathematics and English between ethnic minority and white British born pupils throughout the years of compulsory schooling. Our main analysis is based on administrative data covering all pupils in England within the public schooling system. The perhaps most remarkable finding of our analysis is that in England, no group of ethnic minority pupils loses ground relative to white British born pupils. While some groups (like Black Caribbean and Bangladeshi pupils) face large negative achievement gaps on school entry, and remain on average slightly underperforming, all groups gain considerably compared to the White British born. This is in contrast to the US, where the achievement gap between the white and black pupils rises substantially during the period of compulsory schooling (see e.g. Fryer and Levitt 2004, 2007, and Hanushek and Rivkin, 2006).

We find that language spoken at home is an important reason for the low achievement of ethnic minority pupils at the beginning of primary school. However, the impact of language on achievement declines as children grow older. Consequently, language helps to explain why ethnic minority pupils make greater progress than white British pupils, and why Black Caribbean pupils make smaller progress than any other ethnic group. Moreover, with the exception of Indian and Chinese pupils, ethnic minority pupils are substantially more likely to be living in poverty, as proxied by eligibility for free school lunches. The inclusion of this variable likewise reduces ethnic minority attainment gaps

substantially. However, this cannot explain why ethnic minority pupils make greater progress than white British pupils.

Moreover, ethnic minority pupils attend very different schools than white British pupils in terms of the average share of white British classmates, the average share of poor classmates that are eligible for free school lunches, and the average achievement of classmates. While much of the relative improvement of ethnic minority pupils occurs within schools, at least 20% of the relative improvement between the beginning of primary and the end of secondary school occurs between schools.

We also provide suggestive evidence that is consistent with the idea that teacher incentives to teach to the test caused by the annual publication of school league tables contribute to explaining the remarkable relative progress of ethnic minority pupils from Key Stage 3 (age 13/14) to Key Stage 4 (age 15/16). In particular, such teacher incentives may contribute to why test score gains of ethnic minority pupils relative to White British pupils are higher among poor pupils and in poor schools. Teacher incentives are similar at the end of primary school at Key Stage 2, but here the evidence is weaker.

Unlike a lot of the more descriptive work in this area, we have attempted to try to understand why ethnic differences in the level and progression of pupil achievement during the compulsory school years emerge. A 'naïve' conclusion one may reach from our analysis is that schools and teacher behaviour matter for explaining ethnic differences in pupil achievement and (probably more importantly) their evolution through the school careers of children. Future research needs to try and unpack how and why this occurs. For instance, is it due to peer effects, or due to teacher practices and policies? We intend to dig deeper in our future research to try and shed some light on these important, highly policy relevant questions.

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Appendix A: National Pupil Data Base

We define variables as follows.

Test scores: The mathematics test score in Key Stage 1 is based on the National Curriculum level awarded for the mathematics test. Following the Department of Education and Skills, we assign a value of 3 if the pupil is working toward level 1, and 9, 13, 15, 17, 21, and 27 if level is 1, 2C, 2B, 2A, 3, 4 or 4+ was awarded. The English test score in Key Stage 1 is an average of the National Curriculum level awarded for the reading and writing test. We use the same rule as above to convert the level into a point score. The mathematics and English test score in Key Stage 2 and 3 is the total number of points in the National Curriculum English and Mathematics tests. The mathematics and English test score in Key Stage 4 is based on the highest grade achieved in mathematics and English, where we assign values 7, 12, 20, 30, 40, 50, 60, 70, and 75 to levels U, G to A, and A*. Our findings are robust to alternative assignment rules.

Ethnicity: In PLASC, ethnicity codes differ for the year 2002, 2003, and 2004 to 2007. The ethnicity variable refers to year 2004. If the ethnicity variable is missing for this year, we use the value for the year 2005, 2006, or 2007. 'Black, Other' comprises the categories 'African' and 'Any other black background'. We also summarize categories 'Any Other Asian Background', 'Any Other Ethnic Group', 'Any Other White Background', and pupils with mixed background into the category 'Other'.

Free Meal Status: Eligibility for free school lunches depends on receipt (by parent or pupil) of Income Support, Income Based Jobseeker's Allowance or support under Part 6 of Immigration and Asylum Act 1999. Since this information comes from the PLASC data for the years 2002 to 2007, it is impossible to link this measure to Key Stage 1. Hence, for Key Stage 1, free school meal eligibility refers to Key Stage 2; for all other key stages, it refers to the corresponding key stage.

Appendix B: Millennium Cohort Survey

In the *Vocabulary Test*, the interviewer shows the child a picture and asks the child what the thing on the picture is called. For example, the picture shows an igloo. Only 'igloo' is coded as the correct answer. If the child answers 'snow house', 'Eskimo house' or 'ice house', the answer is marked as incorrect.

In the *Picture Similarity Assessment*, the interviewer points to a row of pictures, shows the child another picture and asks which picture this one goes with. For instance, a picture of a book goes with a picture of a girl who is reading a book.

In the *Pattern Construction Assessment*, each child is given an easel, six black and yellow foam squares, and 9 black and yellow plastic cubes. The interviewer builds a pattern seen on a picture. The child is asked to construct the same pattern. The interviewer notes whether or not the child was able to construct the pattern, and whether the child was able to do so within the time limit.

Table 1: Ethnic Minorities in the Labor Market

			Panel A: Men		
	Share	*born in UK*	*Education*	*Employment Rate*	*Wage*
White British	90.45	94.43	17.38	80.16	11.60
Black, Caribbean	1.08	62.31	17.22	68.76	10.32
Black, Other	1.06	17.25	20.39	64.47	9.26
Bangladeshi	0.56	20.68	17.61	59.55	6.73
Pakistani	1.38	37.03	18.43	62.31	8.54
Indian	2.26	37.74	19.52	75.29	11.72
Chinese	0.47	23.59	20.10	61.99	11.87
Other	2.74	30.61	19.38	64.85	10.46
			Panel B: Women		
	Share	*born in U.K.*	*Education*	*Employment Rate*	*Wage*
White British	90.16	93.82	17.37	67.57	8.93
Black, Caribbean	1.25	59.53	17.50	64.70	9.37
Black, Other	1.28	15.85	19.16	50.92	8.74
Bangladeshi	0.53	24.62	16.94	21.83	8.93
Pakistani	1.34	40.94	17.43	24.37	8.59
Indian	2.14	34.57	18.74	58.72	9.08
Chinese	0.47	17.29	19.78	51.52	9.96
Other	2.81	30.97	18.88	52.75	9.43

Note : The table reports the share of ethnic minorities in the working age (16-65) population ('Share'), the share born in the UK, the average age at which individuals left full time education, excluding those currently in education ('Education'), the ratio of employed workers ('Employment Rate'), and the gross hourly wage.
Source : Labour Force Survey, 2003 and 2004, working age population (16-65).

Table 2: Ethnic Minorities in Primary and Secondary Schools

	N	*Share*	*Free Meal Status*	*Mother Tongue*	*Age in KS1*	*Age in KS4*
White British	411,315	87.54%	12.45%	100.00%	6.46	15.46
Black, Caribbean	5,683	1.21%	30.83%	95.09%	6.47	15.46
Black, Other	6,036	1.28%	37.87%	59.84%	6.46	15.45
Bangladeshi	3,701	0.79%	51.96%	3.76%	6.47	15.47
Pakistani	9,953	2.12%	35.35%	11.41%	6.47	15.46
Indian	9,980	2.12%	11.79%	19.54%	6.46	15.46
Chinese	1,287	0.27%	14.06%	26.73%	6.48	15.48
Other	21,893	4.66%	23.94%	75.07%	6.46	15.46

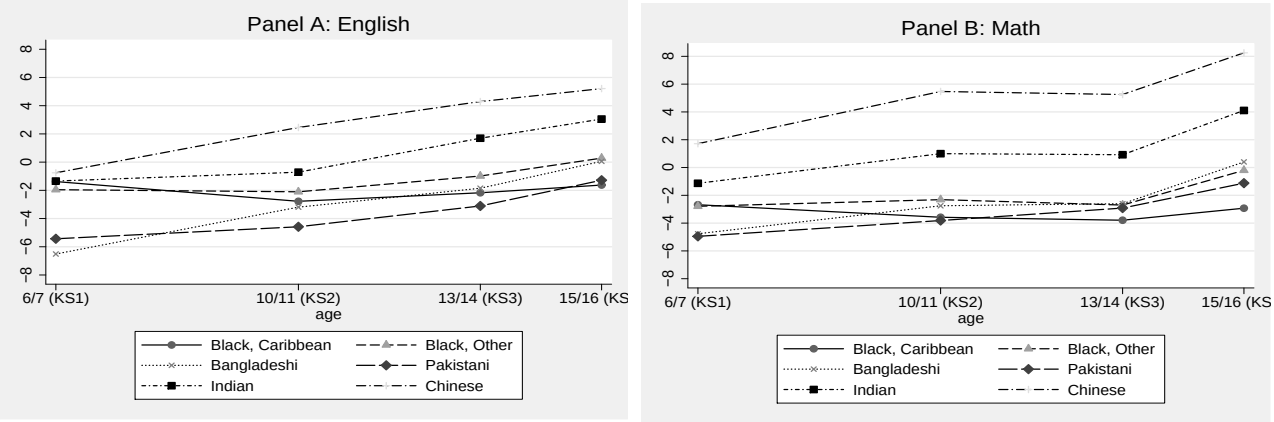
Note : The table reports the number of observations (N), the share of pupils, the share of pupils eligible for free school meals (at Key Stage 2), the share of pupils for whom English is their mother tongue, and the average age of pupils at Key Stage 1 and Key Stage 4 exams in each ethnic category.
Source : NPD and PLASC, Key Stage 1 exams in 1998 and Key Stage 4 exams in 2007.

Table 3: Ethnic Test Score Gaps at School Entry

	Vocabulary	*Pictures*	*Patterns*
Black, Caribbean	-6.608	1.841	-2.677
	(0.925)	(1.369)	(0.844)
Black, Other	-10.579	-0.893	-4.948
	(0.789)	(0.590)	(0.910)
Bangladeshi	-15.135	-3.655	-5.391
	(0.705)	(0.643)	(0.502)
Pakistani	-15.513	-2.837	-4.868
	(0.855)	(1.167)	(0.815)
Indian	-6.177	0.312	-0.992
	(0.944)	(0.739)	(0.628)
Chinese	-6.437	5.208	4.332
	(4.310)	(2.861)	(1.750)
Other	-4.213	0.618	-0.967
	(0.727)	(0.531)	(0.530)

Note: The table shows achievement gaps at age 5 (before the start of school) between ethnic minorities and the White British in three tests: naming vocabulary test, picture similarity test, and pattern construction test. Results are weighted to make them representative for the child population as a whole.
Source: Millennium Cohort Survey (MCS), age 5. N=9,012 to 9,039.

Figure 1: Ethnic Test Score Gaps Throughout Compulsory Schooling



Note : The figures show the evoloution of the ethnic test score gaps throughout compulsory schooling, at age 6/7 (Key Stage 1), age 10/11 (Key Stage 2), age 13/14 (Key Stage 3), and age 15/16 (Key Stage 4).Test scores are standardized with mean 50 and standard deviation 10.
Source : NPD and PLASC, Key Stage 1 exams in 1998 and Key Stage 4 exams in 2007. N=469,848.

Table 4a: Ethnic English Test Score Gaps through Compulsory Schooling: The Role of Family Background Characteristics

	Panel A: Primary School (Key Stage 1 and Key Stage 2)							
	Key Stage 1 (Age 6/7)				Key Stage 2 (Age 10/11)			
	no controls	*language*	*poverty*	*both*	*no controls*	*language*	*poverty*	*both*
Black, Caribbean	-1.377	-1.201	-0.410	-0.270	-2.777	-2.655	-1.758	-1.671
	0.156	0.155	0.152	0.153	0.157	0.157	0.154	0.154
Black, Other	-1.955	-0.513	-0.618	0.590	-2.104	-1.107	-0.694	0.060
	0.168	0.167	0.160	0.161	0.158	0.156	0.151	0.152
Bangladeshi	-6.513	-3.058	-4.435	-1.530	-3.192	-0.804	-1.001	0.813
	0.282	0.300	0.282	0.298	0.227	0.248	0.233	0.252
Pakistani	-5.434	-2.254	-4.229	-1.549	-4.583	-2.385	-3.313	-1.639
	0.180	0.204	0.181	0.203	0.161	0.186	0.160	0.184
Indian	-1.342	1.547	-1.377	1.069	-0.712	1.284	-0.749	0.779
	0.147	0.167	0.144	0.163	0.147	0.164	0.142	0.159
Chinese	-0.756	1.875	-0.671	1.555	2.456	4.274	2.545	3.935
	0.294	0.302	0.290	0.298	0.277	0.284	0.274	0.282
Other	-0.792	0.103	-0.188	0.564	0.180	0.799	0.817	1.286
	0.093	0.088	0.088	0.084	0.089	0.089	0.084	0.084
language		3.590		3.039		2.481		1.898
poverty			-5.261	-5.211			-5.546	-5.514
	Panel B: Secondary School (Key Stage 3 and 4)							
	Key Stage 3 (Age 13/14)				Key Stage 4 (Age 15/16)			
	no controls	*language*	*poverty*	*both*	*no controls*	*language*	*poverty*	*both*
Black, Caribbean	-2.173	-2.093	-1.153	-1.110	-1.625	-1.598	-0.704	-0.710
	0.217	0.216	0.203	0.202	0.204	0.202	0.192	0.191
Black, Other	-0.986	-0.329	0.429	0.801	0.284	0.507	1.570	1.519
	0.232	0.227	0.220	0.219	0.210	0.208	0.195	0.196
Bangladeshi	-1.849	-0.275	0.839	1.732	0.057	0.592	2.841	2.718
	0.302	0.329	0.298	0.324	0.272	0.291	0.276	0.290
Pakistani	-3.108	-1.659	-1.567	-0.743	-1.281	-0.789	0.302	0.188
	0.253	0.287	0.237	0.268	0.212	0.240	0.196	0.223
Indian	1.696	3.012	1.754	2.507	3.055	3.502	3.132	3.028
	0.234	0.274	0.222	0.259	0.187	0.215	0.173	0.202
Chinese	4.294	5.493	4.455	5.140	5.212	5.619	5.417	5.322
	0.328	0.347	0.316	0.336	0.268	0.286	0.263	0.282
Other	0.889	1.297	1.562	1.794	1.145	1.284	1.774	1.743
	0.148	0.145	0.135	0.134	0.134	0.135	0.122	0.123
language		1.636				0.556		-0.129
poverty			-6.134				-6.524	-6.527
	Panel C: Share Explained by Family Background Characteristics							
	KS1-->KS2		**KS2-->KS3**		**KS3-->KS4**		**KS1-->KS4**	
	language	*poverty*	*language*	*poverty*	*language*	*poverty*	*language*	*poverty*
Black, Caribbean	-3.89%	3.74%	6.86%	-0.22%	9.68%	18.14%	-60.00%	-18.42%
Black, Other	-299.44%	48.65%	30.36%	-0.53%	34.14%	10.22%	54.42%	2.30%
Bangladeshi	32.14%	-3.39%	60.55%	-37.09%	54.52%	-4.98%	44.44%	-10.74%
Pakistani	115.45%	-7.66%	50.73%	-18.40%	52.37%	-2.30%	64.72%	-9.12%
Indian	141.68%	0.30%	-82.74%	-3.93%	63.93%	-1.39%	55.52%	-2.54%
Chinese	25.30%	-0.14%	33.67%	189.72%	698.36%	-4.80%	37.25%	-2.01%
Other	28.45%	-3.36%	29.70%	-5.17%	105.16%	17.19%	39.05%	-1.31%

Note: Panel A (Key Stage 1 and 2) and Panel B (Key Stage 3 and 4) report how achievement gaps in English between ethnic minorities and the White British change if one controls for English as a mother tongue (language) and free meal status (poverty). Each panel aslo reports the effect of language and poverty on achievement (last two rows). Panel C reports the share of the widening or narrowing of the achievement gap between Key Stage 1 and 2, Key Stage 2 and 3, Key Stage 3 and 4, as well as between Key Stage 1 and 4, that can be attributed to language and free meal status. Test scores are standardized with mean 50 and standard deviation 10. Standard errors in parentheses allow for clustering at the school level.

Source: NPD and PLASC, Key Stage 1 exams in 1998 and Key Stage 4 exams in 2007. N=469,848.

Table 4b: Ethnic Math Test Score Gaps through Compulsory Schooling: The Role of Family Background Characteristics

	Panel A: Primary School (Key Stage 1 and Key Stage 2)							
	Key Stage 1 (Age 6/7)				Key Stage 2 (Age 10/11)			
	no controls	*language*	*poverty*	*both*	*no controls*	*language*	*poverty*	*both*
Black, Caribbean	-2.677	-2.562	-1.927	-1.839	-3.578	-3.508	-2.686	-2.644
	0.167	0.166	0.168	0.167	0.164	0.163	0.163	0.163
Black, Other	-2.788	-1.849	-1.750	-0.992	-2.311	-1.739	-1.076	-0.713
	0.173	0.171	0.168	0.168	0.170	0.170	0.166	0.166
Bangladeshi	-4.765	-2.516	-3.153	-1.329	-2.752	-1.381	-0.833	0.040
	0.284	0.296	0.294	0.304	0.246	0.264	0.246	0.262
Pakistani	-4.952	-2.882	-4.018	-2.334	-3.813	-2.551	-2.701	-1.896
	0.195	0.211	0.199	0.213	0.178	0.201	0.180	0.202
Indian	-1.134	0.746	-1.161	0.375	0.997	2.143	0.965	1.699
	0.176	0.189	0.175	0.187	0.152	0.171	0.147	0.166
Chinese	1.715	3.427	1.781	3.179	5.472	6.516	5.550	6.219
	0.299	0.310	0.298	0.309	0.251	0.263	0.247	0.259
Other	-0.628	-0.045	-0.159	0.313	0.191	0.546	0.749	0.975
	0.089	0.089	0.086	0.087	0.087	0.088	0.083	0.085
language		2.337		1.909		1.425		0.913
poverty			-4.080	-4.049			-4.859	-4.844
	Panel B: Secondary School (Key Stage 3 and 4)							
	Key Stage 3 (Age 13/14)				Key Stage 4 (Age 15/16)			
	no controls	*language*	*poverty*	*both*	*no controls*	*language*	*poverty*	*both*
Black, Caribbean	-3.792	-3.742	-3.178	-3.151	-2.927	-2.939	-2.022	-2.064
	0.221	0.219	0.214	0.212	0.201	0.200	0.197	0.196
Black, Other	-2.701	-2.292	-1.848	-1.612	-0.200	-0.298	1.064	0.699
	0.252	0.242	0.244	0.239	0.236	0.238	0.221	0.223
Bangladeshi	-2.606	-1.627	-0.987	-0.419	0.404	0.170	3.141	2.265
	0.357	0.382	0.335	0.361	0.256	0.286	0.233	0.264
Pakistani	-2.915	-2.014	-1.987	-1.462	-1.123	-1.339	0.433	-0.376
	0.268	0.292	0.258	0.281	0.221	0.258	0.206	0.241
Indian	0.920	1.739	0.955	1.435	4.108	3.912	4.183	3.444
	0.258	0.267	0.251	0.259	0.214	0.249	0.202	0.239
Chinese	5.255	6.000	5.351	5.788	8.253	8.075	8.455	7.782
	0.376	0.387	0.371	0.382	0.262	0.288	0.258	0.283
Other	-0.180	0.074	0.226	0.373	0.787	0.726	1.406	1.179
	0.158	0.149	0.151	0.080	0.137	0.139	0.127	0.127
language		1.017		0.596		-0.243		-0.919
poverty			-3.694	-3.682			-6.415	-6.435
	Panel C: Share Explained by Family Background Characteristics							
	KS1-->KS2		**KS2-->KS3**		**KS3-->KS4**		**KS1-->KS4**	
	language	*poverty*	*language*	*poverty*	*language*	*poverty*	*language*	*poverty*
Black, Caribbean	-4.97%	15.87%	-9.35%	-130.20%	7.15%	-33.65%	-50.66%	62.29%
Black, Other	76.83%	-41.51%	-41.99%	-98.19%	20.24%	-16.47%	40.04%	-8.77%
Bangladeshi	43.60%	-15.28%	268.88%	206.06%	40.30%	-37.14%	48.04%	-21.76%
Pakistani	70.96%	-15.65%	40.18%	20.53%	62.32%	-35.08%	59.69%	-16.25%
Indian	34.42%	0.24%	45.29%	87.39%	31.82%	-1.28%	39.60%	-1.96%
Chinese	17.78%	-0.33%	-137.26%	96.10%	30.80%	-3.49%	28.91%	-2.08%
Other	27.76%	-10.92%	-27.38%	-41.10%	32.50%	-22.07%	45.46%	-10.63%

Note: Panel A (Key Stage 1 and 2) and Panel B (Key Stage 3 and 4) report how achievement gaps in Mathematics between ethnic minorities and the White British change if one controls for English as a mother tongue (language) and free meal status (poverty). Each panel aslo reports the effect of language and poverty on achievement (last two rows). Panel C reports the share of the widening or narrowing of the achievement gap between Key Stage 1 and 2, Key Stage 2 and 3, Key Stage 3 and 4, as well as between Key Stage 1 and 4, that can be attributed to language and free meal status. Test scores are standardized with mean 50 and standard deviation 10. Standard errors in parentheses allow for clustering at the school level.

Source: NPD and PLASC, Key Stage 1 exams in 1998 and Key Stage 4 exams in 2007. N=469,848.

Table 5a: Ethnic English Test Score Gaps through Compulsory Schooling: The Role of Schools

		Panel A: OLS versus Fixed School Effect Estimates			
		Key Stage 1	**Key Stage 2**	**Key Stage 3**	**Key Stage 4**
Black, Caribbean	OLS	-1.377	-2.777	-2.173	-1.625
	School FE	-0.115*	-1.668	-1.410	-0.723
Black, Other	OLS	-1.955	-2.104	-0.986	0.284
	School FE	-0.331	-1.022	-0.799	0.544
Bangladeshi	OLS	-6.513	-3.192	-1.849	0.057
	School FE	-4.071	-1.267	-0.092*	1.835
Pakistani	OLS	-5.434	-4.583	-3.108	-1.281
	School FE	-3.202	-2.435	-1.611	0.305
Indian	OLS	-1.342	-0.712	1.696	3.055
	School FE	0.048*	0.127*	1.353	2.814
Chinese	OLS	-0.756	2.456	4.294	5.212
	School FE	-0.283*	2.375	2.463	3.653
Other	OLS	-0.792	0.180	0.889	1.145
	School FE	-0.236	0.323	0.330	0.570
		Panel B: Within/Between School Decomposition			
		Key Stage 1	**Key Stage 2**	**Key Stage 3**	**Key Stage 4**
Black, Caribbean	within	-0.209	-1.273	-1.063	-0.387
	between	-1.168	-1.504	-1.110	-1.238
Black, Other	within	-0.323	-0.700	-0.523	0.494
	between	-1.631	-1.403	-0.463	-0.210
Bangladeshi	within	-2.053	-0.644	-0.113	1.128
	between	-4.460	-2.548	-1.736	-1.071
Pakistani	within	-1.533	-1.178	-1.040	0.173
	between	-3.900	-3.405	-2.068	-1.454
Indian	within	-0.014	0.057	0.877	1.868
	between	-1.328	-0.769	0.819	1.187
Chinese	within	-0.269	2.213	2.314	3.510
	between	-0.486	0.243	1.979	1.702
Other	within	-0.095	0.299	0.286	0.490
	between	-0.696	-0.119	0.603	0.655
		Panel C: Share that Happens Within Schools			
		KS1-->KS2	**KS2-->KS3**	**KS3-->KS4**	**KS1-->KS4**
Black, Caribbean		75.99%	34.72%	123.38%	71.88%
Black, Other		253.26%	15.81%	80.07%	36.49%
Bangladeshi		42.41%	39.57%	65.11%	48.42%
Pakistani		41.77%	9.37%	66.38%	41.09%
Indian		11.22%	34.06%	72.90%	42.79%
Chinese		77.27%	5.54%	130.21%	63.33%
Other		40.62%	-1.94%	80.01%	30.25%

Note: Panel A compares OLS with fixed school (within) estimates of the ethnic English test score gap. For the school fixed effects estimates, a star (*) indicates that the relative within-school achievement gap is not statistically different from zero at a 5% level. Panel B decomposes the test score gap (estimated by OLS) into a within and between school component, following Hanushek et al. (2007). Panel C reports the share of the widening or narrowing test score gap between Key Stage 1 and 2, Key Stage 2 and 3, Key Stage 3 and 4, as well as Key Stage 1 and 4, that occurs within schools.
Source: NPD and PLASC, Key Stage 1 exams in 1998 and Key Stage 4 exams in 2007. N=469,848.

Table 5b: Ethnic Math Test Score Gaps through Compulsory Schooling: The Role of Schools

		Panel A: OLS versus Fixed School Effect Estimates			
		Key Stage 1	**Key Stage 2**	**Key Stage 3**	**Key Stage 4**
Black, Caribbean	OLS	-2.677	-3.578	-3.792	-2.927
	School FE	-2.369	-2.565	-1.800	-1.826
Black, Other	OLS	-2.788	-2.311	-2.701	-0.200
	School FE	-2.444	-1.375	-1.174	0.112*
Bangladeshi	OLS	-4.765	-2.752	-2.606	0.404
	School FE	-4.456	-1.402	-0.026*	2.320
Pakistani	OLS	-4.952	-3.813	-2.915	-1.123
	School FE	-4.001	-1.990	-0.837	0.847
Indian	OLS	-1.134	0.997	0.920	4.108
	School FE	-0.624	1.539	1.030	4.010
Chinese	OLS	1.715	5.472	5.255	8.253
	School FE	1.755	5.528	3.879	6.683
Other	OLS	-0.628	0.191	-0.180	0.787
	School FE	-0.598	0.343	0.038*	0.455
		Panel B: Within/Between School Decomposition			
		Key Stage 1	**Key Stage 2**	**Key Stage 3**	**Key Stage 4**
Black, Caribbean	within	-1.855	-1.816	-1.314	-1.123
	between	-0.822	-1.762	-2.478	-1.804
Black, Other	within	-1.690	-0.882	-0.787	0.338
	between	-1.098	-1.429	-1.914	-0.538
Bangladeshi	within	-2.228	-0.686	0.020	1.512
	between	-2.536	-2.066	-2.626	-1.108
Pakistani	within	-1.878	-0.929	-0.500	0.510
	between	-3.074	-2.885	-2.415	-1.633
Indian	within	-0.417	0.915	0.713	2.670
	between	-0.717	0.082	0.207	1.437
Chinese	within	1.619	5.153	3.824	6.563
	between	0.096	0.319	1.431	1.691
Other	within	-0.408	0.299	0.048	0.421
	between	-0.220	-0.108	-0.228	0.366
		Panel C: Share that Happens Within Schools			
		KS1-->KS2	**KS2-->KS3**	**KS3-->KS4**	**KS1-->KS4**
Black, Caribbean		-4.33%	-234.94%	22.02%	-292.74%
Black, Other		169.40%	-24.52%	44.98%	78.37%
Bangladeshi		76.63%	484.22%	49.55%	72.36%
Pakistani		83.36%	47.71%	56.39%	62.37%
Indian		62.52%	263.81%	61.42%	58.90%
Chinese		94.06%	611.06%	91.34%	75.61%
Other		86.30%	67.76%	38.57%	58.55%

Note: Panel A compares OLS with fixed school (within) estimates of the ethnic Mathematics test score gap. For the school fixed effects estimates, a star (*) indicates that the relative within-school achievement gap is not statistically different from zero at a 5% level. Panel B decomposes the test score gap (estimated by OLS) into a within and between school component, following Hanushek et al. (2007). Panel C reports the share of the widening or narrowing test score gap between Key Stage 1 and 2, Key Stage 2 and 3, Key Stage 3 and 4, as well as Key Stage 1 and 4, that occurs within schools.

Source: NPD and PLASC, Key Stage 1 exams in 1998 and Key Stage 4 exams in 2007. N=469,848.

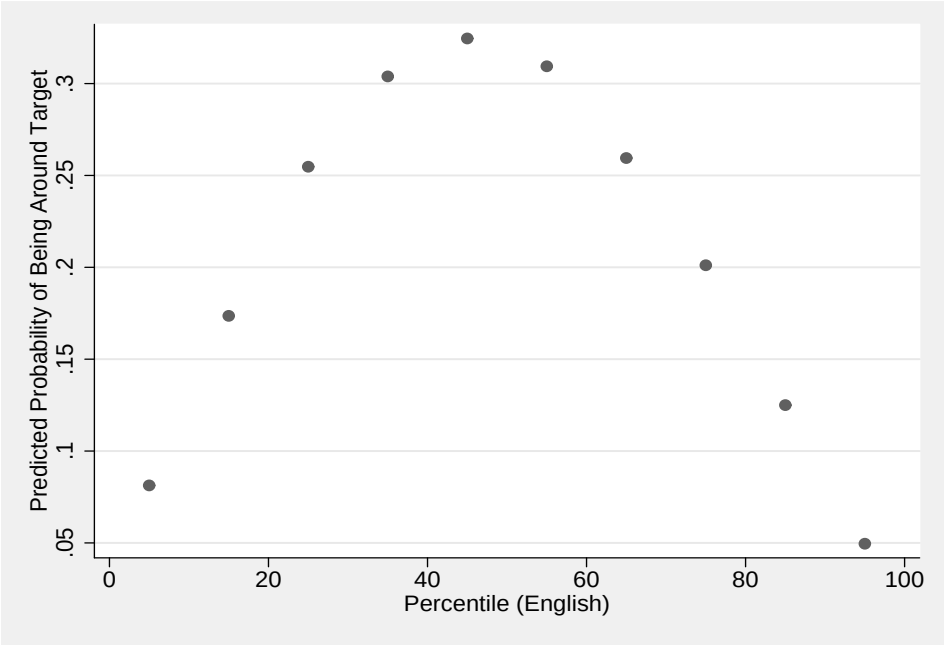
Table 6: Gains in English Test Scores between Key Stage 3 and 4 and the Probability of Ending Up Close to the Key Stage 4 Target

Panel A: By Free Meal Status				
	Gains KS3 to KS4 (English)		*Actual Probability of Being Around Target*	
Eligible for free meal				
White British	-1.226	(0.041)	0.191	(0.002)
Black, Caribbean	0.819	(0.126)	0.225	(0.006)
Black, Other	2.548	(0.120)	0.242	(0.004)
Bangladeshi	2.033	(0.203)	0.235	(0.006)
Pakistani	1.629	(0.107)	0.228	(0.005)
Indian	1.453	(0.160)	0.229	(0.007)
Chinese	1.323	(0.253)	0.196	(0.013)
Other	0.980	(0.094)	0.219	(0.003)
Not eligible for free meal				
White British	-0.090	(0.030)	0.208	(0.001)
Black, Caribbean	0.881	(0.085)	0.239	(0.004)
Black, Other	1.694	(0.089)	0.239	(0.003)
Bangladeshi	1.758	(0.137)	0.223	(0.005)
Pakistani	1.612	(0.086)	0.224	(0.004)
Indian	1.269	(0.107)	0.193	(0.004)
Chinese	1.037	(0.113)	0.141	(0.005)
Other	0.450	(0.058)	0.198	(0.002)
Correlation, Actual Probability:			0.4558	(0.076)
Correlation, Predicted Probability:			0.3802	(0.293)
Panel B: Poor versus Rich Schools				
	Gains KS3 to KS4 (English)		*Actual Probability of Being Around Target*	
Poor Schools				
White British	-0.842	(0.143)	0.220	(0.005)
Black, Caribbean	1.516	(0.195)	0.234	(0.011)
Black, Other	3.113	(0.185)	0.256	(0.006)
Bangladeshi	2.185	(0.277)	0.234	(0.006)
Pakistani	2.014	(0.178)	0.236	(0.007)
Indian	2.103	(0.340)	0.230	(0.014)
Chinese	2.051	(0.319)	0.221	(0.018)
Other	1.648	(0.174)	0.237	(0.005)
Rich Schools				
White British	-0.022	(0.045)	0.191	(0.001)
Black, Caribbean	0.079	(0.170)	0.214	(0.008)
Black, Other	0.600	(0.151)	0.196	(0.008)
Bangladeshi	1.082	(0.196)	0.192	(0.012)
Pakistani	0.769	(0.172)	0.176	(0.009)
Indian	0.444	(0.212)	0.131	(0.007)
Chinese	0.438	(0.175)	0.102	(0.006)
Other	0.038	(0.102)	0.165	(0.004)
Correlation, Actual Probability:			0.3676	(0.020)
Correlation, Predicted Probability:			0.3387	(0.033)

Note: The first column reports the gain in English test scores from Key Stage 3 to Key Stage 4 by ethnicity and free meal status (Panel A) as well as by ethnicity and the share of pupils eligible for free meals in schools (Panel B). The second column shows the share of pupils who end up close to the target at Key Stage 4. Standard errors in parentheses are clustered at the school level. We then report the correlation between the two. In the final row of each panel, we report the correlation between the predicted (as opposed to actual) probability of ending up close to the target and test score gains between Key Stage 3 and Key Stage 4. The predicted probability is obtained from a linear regression of ending up close to the target on Key Stage 3 test scores. Here, the number in parentheses refers to the p-value for the hypothesis that the correlation is 0.

Source: NPD and PLASC, Key Stage 3 exams between 2001 and 2005 andKey Stage 4 exams between 2003 and 2007.

Figure 2: English Test Score at Key Stage 3 and Predicted Probability of Just Passing or Failing the Target



Note: The figure plots coefficients from a linear regression that regresses an indicator variable for whether a pupil just passed or just failed the target in Key Stage 4 on the decile of their English test score distribution in Key Stage 3. Just failing or just passing the target is defined as passing between 4 and 6 GCSEs, including English and Mathematics, with grade C or better.
Source: NPD and PLASC, Key Stage 3 exams between 2001 and 2005 andKey Stage 4 exams between 2003 and 2007.